on the Pearson scale. In other words, on the 7 per cent. basis of excellence, the grade "excellent" is easier to reach in a small class than in a large one. If a class is divided arbitrarily into four groups, equal in number, as in the Missouri system, then the lower limit of merit for the top group is .6588 for a class of 100, .6368 for a class of 40, and .5972 for a class of 20. Twenty-five per cent. of a class of 51 members is 13, but only 12 of these have a mark above .6588 on the Pearson scale. Such variability of standards does violence to our sense of scientific rigor, though the practical results do not usually differ, owing to the fact that in practise only integral numbers apply.

In a scientific marking system the first requisite is uniformity of standards of reference. Lack of uniformity is sufficient reason for rejecting the classification into groups on the percentage basis, as in the Missouri system and others, unless that basis has some advantages which compensate for its theoretical defects. Such advantages it is difficult to discover.

To summarize, our proposed plan of marking is as follows:

1. A system of preliminary marking is used, merely to determine the rank of the students.

2. After the rank is fixed, each student is assigned the marks given in our table, with such slight modifications of the marks as are necessary in the judgment of the instructor.

The advantages of this system are:

1. It rests upon correct statistical theory.

2. The groups called "superior," "medium," "inferior" cover equal ranges of ability. These ranges are constant, no matter what the size of the class may be. Neither the top group called "excellent," nor the bottom group called "poor" has a fixed extreme limit, thereby providing, as the system should, for the grading of men of genius at one end and of the intellectual sluggards at the other.

3. It tends to eliminate the personal equation of the examiner.

4. The method is absolute, except in the determination of the deviations of the marks of a class from the *average* marks of classes of that size.

"This is a complicated system," you will say. So it is, though not quite so complex, perhaps, as it appears at first sight. Chemists and physicists know that any process of exact measurements requires time, patience and skill. That is true of our plan.

FLORIAN CAJORI

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

SECTION B—PHYSICS

SECTION B—Physics—of the American Association for the Advancement of Science held its meetings jointly with the American Physical Society during the convocation week beginning December 29, 1913, at the Georgia School of Technology.

Professor Anthony Zeleny, of the University of Minnesota, was elected vice-president of the section for the ensuing year. There were also elected to the Sectional Committee, Professor D. C. Miller, Case School of Applied Science, 4 years, and Professor G. W. Stewart, University of Iowa, 5 years.

As customary in the past all the shorter and more technical physical papers were given under the auspices of the American Physical Society. On the other hand the longer papers, and, in this case, those that dealt especially with geophysical problems, were grouped together and given under the auspices of Section B. These were:

The Methods of Physical Science, to What are They Applicable?: ARTHUR G. WEBSTER.

This was the vice-presidential address, and is given in full in SCIENCE, 39, pp. 42–51, 1914.

The Present Status of the Magnetic Survey of the Earth: L. A. BAUER.

A concise summary was given in this paper of some of the more important investigations undertaken, and conclusions reached, by the department of terrestrial magnetism of the Carnegie Institution of Washington. The great progress of the magnetic survey of the earth, as conducted by this institution, both over land and over water, was shown on a projected map. Many thousands of miles, even hundreds of thousands, have been traversed in obtaining the data necessary to the accurate magnetic mapping of the earth; nor were the routes followed along the safe and beaten tracks of travel, but rather across the least fre-

quented and even the more dangerous regions, and yet, in spite of the great distances travelled and all the excessive difficulties encountered, the entire survey has thus far been made without the occurrence of a single fatal accident.

Isostacy and the Size and Shape of the Earth: William Bowie.

The determination of the size and shape of the earth would be a simple matter if its geoid or sea-level surface formed a geometrical figure, but as it does not the actual problem is a difficult one. These deviations, it was shown, are due to differences in the vertical distribution of mass in adjacent isostatic regions. When corrections for the effects of topography and isostatic compensation are applied to the astronomically observed positions the deviation of the geoid from the spheroid surface is largely eliminated.

The shape but not the size of the earth may be determined from the observed values of the force of gravity at stations widely separated in latitude. Here again a correction for topography and isostatic compensation is necessary for the best results. Absolute values of gravity can be obtained only with a long series of observations, and therefore nearly all gravity determinations are made by the relative method. Those of the Coast and Geodetic Survey are based on the absolute value at Potsdam.

Investigations made by the U. S. Coast and Geodetic Survey during recent years show that the area of the United States, taken as a whole, is in a state of perfect isostacy, and that areas of limited extent deviate only slightly from that state. The paper will later appear in full.

Seismology: Otto Klotz.

The most improved seismological apparatus, the data obtained by them and the conclusions logically deduced from this data were all discussed at some length. A full and interesting account, together with many illustrations, was given of a recent installation of seismological apparatus that registers in magnified form even those small vibrations of the earth's crust caused by the passage of ocean waves.

The Factors of Climatic Control: W. J. Humphreys.

It was explained that such things as land elevation, oceanic circulation and volcanic dust in the high atmosphere are among the most important factors of climatic control, assuming of course approximate constancy of atmospheric composition and solar radiation.

Both the direct or primary and the indirect or secondary effects of each of these factors were explained in some detail and illustrated by statistical curves.

It is expected that the paper will later appear in full.

There was also one joint meeting with Section C—Chemistry, at which the following papers were presented:

Geochemical Research: John Johnston.

A general account of some of the main lines of geochemical work which are now being pursued in the geophysical laboratory of the Carnegie Institution.

The Ternary System Lime-Alumina-Silica: G. A. Rankin.

The author discussed the results of an extended investigation of this system, which is important from a geological standpoint as well as from the fact that these three oxides are the essential ingredients in the manufacture of portland cement clinker. The fields of stability of all the substances which may be encountered in this system have now been determined satisfactorily; so that it is now possible to state precisely what happens when any mixture of the above three oxides is heated, and hence incidentally to specify the essential constituents of portland cement clinker.

W. J. Humphreys,
Secretary of Section B

SOCIETIES AND ACADEMIES

ACADEMY OF SCIENCES OF ST. LOUIS

At a meeting held June 1, Professor Nipher gave a brief account of a new method of decomposing water.

A continuous discharge from electrodes in separate beakers was made to pass through a capillary tube, forming a siphon connecting the water in the two beakers, water was decomposed at the electrodes and within the siphon. More than 50 times as much explosive gas was discharged from the siphon as was collected in the tubes around the electrodes. Distilled water which had been freshly boiled was used.

A full account of this result will be given in a volume now in the hands of the publisher, which will give a full account of the results of Professor Nipher's experimental work during the last five years.

C. H. Danforth,
Secretary